

Testicular Cancer

Derek Raghavan

Cancer of the testis is a relatively uncommon malignancy in the general male community, but is the commonest cancer in men aged 18–30, with an annual incidence of about 5–7 new cases per 100,000 males per year. In this age group, most primary testis cancers are derived from germ cells within the testis and are known as germ cell tumors. There are two common types of germ cell tumor—seminoma and non-seminomatous germ cell tumors (NSGCT). The NSGCTs consist of three different pathological types—embryonal cancer, malignant teratoma, and choriocarcinoma. These tumors resemble aspects of the developing fetus under the microscope. Cancer occasionally occurs in the testis of men aged 60 and above, but there is less than 1 case per 100,000 males per year.

Lymphoma

In older men, testicular cancer may occur as a primary tumor or as a metastatic deposit. The most common tumor arising in the testis in elderly men is malignant lymphoma, most commonly of the non-Hodgkin's type. These tumors usually are found as part of a systemic syndrome, with lymphomatous tissue being identified in the lymph nodes elsewhere in the body and sometimes in other organs, such as lungs and brain. Testicular lymphoma is known to occur in association with lymphoma arising in the lymph nodes around the tonsils and sometimes in the central nervous system. Treatment depends on the distribution of the disease, but usually requires systemic chemotherapy with or without radiotherapy. Surgical removal of the testis may not be necessary, especially in the setting of multisite disease, although surgical removal and preventative radiotherapy to adjacent nodes may achieve cure in patients with extremely localized lymphoma in the testis.

Germ Cell Tumors: Seminoma

Seminoma is another primary testis cancer, usually found in men aged 25–35, but occasionally found in a patient aged 60 or older. This cancer, one of the germ

cell tumors, is characterized by a diffuse, large cell, symmetrical infiltration of the testis. The cells are characteristically rounded, with prominent nucleoli and are found distributed in sheets. The testis itself is usually symmetrically enlarged, with a firm to hard consistency. The tumor can present as a painless or a painful enlargement of the testis. Occasionally seminoma will spread via the lymphatic vessels to the abdominal (retroperitoneal) lymph nodes. Less commonly, patients will present with lung or bone metastases, whereas metastases at other sites are much less common. For a localized seminoma, treatment consists of surgical removal and preventative radiotherapy to the draining abdominal lymph nodes. For patients with established metastatic seminoma, chemotherapy is usually the treatment of choice. These cancers are usually cured, irrespective of the extent of disease, provided that the correct treatment is used.

Spermatocytic Seminoma

A variant of seminoma that is more commonly found in the elderly than in young patients is spermatocytic seminoma. This tumor is not thought to be derived from germ cells, although its origins remain somewhat controversial. In addition to its occurrence in an older aged population, it can be differentiated from classical seminoma by its lower tendency to metastasize and by the presence of a curious pattern of calcification within the tumor, best seen on x-ray or computerized tomographic (CT) scan. Surgical removal of the testis is usually sufficient treatment for spermatocytic seminoma, although very rarely radiotherapy or chemotherapy may be required.

Nonseminomatous Germ Cell Tumors

Rarely, nonseminomatous germ cell tumors may occur in the testis of the elderly male. In this situation, treatment will depend on the extent of the disease. The primary tumor is usually treated by surgical removal. Staging tests, including the measurement of tumor markers (proteins released into the blood by germ cell tumors) and CT scans, will determine whether the tumor is localized to the testis or has spread to the lymph nodes of the abdomen or to non-nodal sites, such as lungs, liver, bones, and brain. If the tumor is localized to the testis, treatment consists of surgical

removal and either close observation or an operation to remove the lymph nodes of the abdomen (retroperitoneal lymph node dissection). The lymph node dissection gives information about whether the tumor has spread to the nodes, and can be curative if there are only microscopic amounts of cancer in the nodes. If the tumor has spread extensively to the abdominal nodes or further, treatment usually consists of chemotherapy, and most often a combination of three anticancer drugs, cisplatin, etoposide, and bleomycin. This is quite an aggressive treatment, but usually results in cure. However, the older patient is at risk of suffering increased complications from chemotherapy.

Other Testicular Tumors

Other less common testicular tumors are occasionally found in elderly men. These include tumors that arise in the Leydig cells and Sertoli cells of the testis. Both Leydig cell tumors and Sertoli cell tumors usually tend to be localized. These tumors form a spectrum from benign to malignant, although the benign tumors tend to be more common. They usually present as a testicular swelling, and the diagnosis is usually made after a pathological analysis of the surgically removed tumorous testis. Usually these tumors are cured by orchiectomy (removal of one or both testis) alone, although occasionally a retroperitoneal lymph node dissection will be carried out in an attempt to control metastases to other areas. This will be considered particularly for tumors that have spread up the spermatic cord or with a high mitotic index (a high rate of cell division). The role for radiotherapy or chemotherapy is quite limited.

Metastases to the Testis

The testis is sometimes the site of metastatic deposits in older aged men. Tumors known to metastasize to the testis include those arising in the lung, prostate, and malignant melanoma. Occasionally leukemia, a cancer primarily of the bone marrow, will involve the testicles. In the older aged patient with these tumors, treatment is usually palliative (rather than curative) and depends on the sites of involvement and the pathology of the primary tumor. For example, metastatic small-cell lung cancer with metastases to the testis will usually be treated by systemic chemotherapy, sometimes augmented by local radiotherapy. Surgery to the testis is usually not required, other than to

achieve a tissue diagnosis. This can be done by a needle biopsy, depending on the clinical context. Metastases from prostate cancer may be treated by hormonal manipulation (castration) as prostate cancer is very sensitive to suppression of androgens.

Related Topics

➤ Cancer, ➤ Chemotherapy, ➤ Prostate cancer, ➤ Testis

Suggested Readings

- Gospodarowicz MK, Sturgeon JF, Jewett MA (1998) Early stage and advanced seminoma: Role of radiation therapy, surgery and chemotherapy. *Semin Oncol* 25:160–173
- Horwich A, Hamilton CR, Fisher C (1999) Rare tumors of the testis and para-testicular tissues. In: Raghavan D, Brecher M, Johnson D, Meropol N, Thigpen JT (eds) *Textbook of uncommon cancer*, 2nd edn. Wiley-Liss, Chichester, pp 95–113
- Raghavan D, Neville AM (2003) Biology of germ cell tumors. In: Raghavan D (ed) *American Cancer Society Atlas of clinical oncology—Germ cell tumors*, BC Decker Inc, Hamilton, London, pp 1–15

Suggested Resources

- American Society of Clinical Oncology (2002) People Living with Cancer website, pages on testicular cancer. Alexandria, VA; www.plwc.org
- American Cancer Society (2005) Learn about testicular cancer. Atlanta, GA; www.cancer.org
- National Institutes of Health. Testicular cancer page. Bethesda, MD (December 6, 2005); <http://health.nih.gov/result.asp/661>
- The Testicular Cancer Resource Center (1997–2006) Information about testicular cancer and treatment for patients, caregivers, family, friends, and physicians. Website hosted by the Association of Cancer Online Resources (ACOR), (9 February 2006); www.acor.org/diseases/TC

Testis

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The testis (testicle) is a complex, glandular structure that functions as the source of sperm production, and which is the site of testosterone production. During embryological development, two testicles are usually formed, and descend to sit in the scrotum, adjacent to the midline. Each testis consists of seminiferous

tubules and interstitium. The seminiferous tubules contain germ cells, which mature into sperm, and Sertoli cells, which support that maturation. The interstitium contains the Leydig cells, which make male hormones, predominantly testosterone, with the stimulus to production coming from the hypothalamic–pituitary axis. Luteinizing hormone releasing hormone (LHRH) stimulates production of luteinizing hormone (LH) from the pituitary, and this stimulates production of testosterone. Testosterone production has a diurnal rhythm, with the maximum production normally being in the morning.

Testosterone acts on hormonally responsive tissues, such as the prostate, via direct action or after conversion to a metabolite, such as dihydrotestosterone (DHT). It can also be converted into estrogen by the aromatase enzyme. In the situation of androgen responsive tissues, activation of androgenic function is mediated through androgen receptors, transcription factors that are activated by cellular entry of testosterone, usually in the form of DHT.

Older men have lower blood concentrations of androgens, including testosterone, and similar chemicals that arise from the adrenal glands. This decline is usually gradual, progressing through adult life. For example, the circulating level of testosterone is typically in the range of 400–700 ng/dl in men aged 40 years, and may fall to the range of 300–400 ng/dl in men aged 80 years. Around 50% of men older than 70 years have blood levels of testosterone below the normal range.

Low circulating testosterone levels can have many consequences, including reduction in muscle mass, muscle strength, bone mass, libido, and sense of well-being. Anemia may sometimes accompany this situation as erythropoiesis (the formation of red blood cells) is an androgen-dependent function. It has been suggested that reduced levels of circulating androgens may cause impairment of cognition. In some cases, testosterone replacement therapy is prescribed, although caution must be exercised since testosterone therapy may stimulate growth of an occult prostate cancer. The decision to use such treatment represents a balanced judgment that weighs the potential risks and benefits.

The aging testis is subject to atrophy and to infection. Most infections probably arise from the urinary tract, often as a secondary phenomenon in men with benign prostatic hyperplasia, a benign age-related increase in prostatic tissue. As a result of the increased size of the prostate, which surrounds the urethra as it emerges from the lower end of the bladder, there is a

tendency to urinary stasis or slowing, creating a nidus for the development of infection. Occasionally, bacteria from the urine will lodge within the testicles, creating inflammation and infection, so-called orchitis. Orchitis can arise from bacteria, or occasionally will be due to a viral infection (more common in the young). As discussed in a separate section, the testis will sometimes be the site of a primary or secondary malignancy (see “Testicular Cancer”).

Related Topics

➤ [Benign prostatic hyperplasia](#), ➤ [Testicular cancer](#)

Suggested Readings

- Bacon CG, Mittleman MA, Kawachi I, Giovannucci E, Glasser DB, Rimm EB (2003) Sexual function in men older than 50 years of age: Results from the health professionals follow-up study. *Ann Intern Med* 139:161–168
- Harman SM, Metter EJ, Tobin JD, Pearson J, Blackman MR, Baltimore Longitudinal Study of Aging (2001) Longitudinal effects of aging on serum total and free testosterone levels in healthy men. *J Clin Endocrinol Metab* 86:724–731
- Wang C, Swerdloff RS (1997) Androgen replacement therapy. *Ann Med* 29:365–370

Temporary Restraining Orders

Michael Darflinger

According to the US Census Bureau, approximately 28.9% of the American people are 50 or over. This equates to approximately 84 million men and women, many of whom will need a variety of legal services as they continue their day to day lives in an ever more complex world. This may include a need for temporary restraining orders or orders of protection.

In most states there are two options for individuals who have been or fear being abused and neglected to obtain legal protection: an Emergency Order of Protection (EOP) or a similarly named order of protection, which is based on state legislation; and the common law process for a Temporary Restraining Order (TRO), or the state's equivalent. Each option of protection has multiple steps.

The qualifications for an EOP vary from state to state. For example, in Illinois, the person who has been abused or neglected or fears such must reside in the same household as the abuser, be in a relationship with the abuser as a partner, spouse, or dating, or be a family member of the abuser. The EOP is fairly common between individuals who are married or in a relationship; however, the legislation also covers people who are unable to protect themselves due to advanced age. If someone who is older is living with a stranger or family member, whether or not someone in that household is a primary caregiver or whether or not that person is dependent upon anyone in the household, the older person is protected by the statute and can obtain an EOP. The protection also includes individuals who live in shelters. The abused person may seek protection from family members and people with whom they are in a relationship with even if they do not reside in the same household. However, strangers, people who the victim knows but is not in a relationship with, and abusers who are employees of a resting home where the victim resides for example, do not appear to be covered by this statute.

In other states, such as California and New York, the process varies. In California, for example, anyone can obtain an Emergency Protective Order. However, in order to do so, the person abused must call the police who will then come out and take a report. At the same time, the police, if asked to do so, will submit a form requesting an EPO and fax it to an on-call judge, who will make a determination on the spot and the abuser will be served. The abuser must be served for the order to be effective. The entire process may take less than two hours. At the same time, a court date for a permanent protective order will be made.

The process in New York is slightly more complex. The District Attorney will have to either include a request for an EOP (or the equivalent) with or without any criminal charges against the alleged abuser. At the conclusion of the trial, the judge will determine whether or not to grant this and the person will not be protected until they do so. A person who is a family member of the abuser also may bring a case against the abuser in family court, but this is limited to people who are in the same family or share a child in common with the abuser. If the person who has been abused qualifies for this, they can obtain an EPO. If they do not, legal protection will take longer to obtain.

Returning to Illinois as an example, once a person believes that the situation with which they have been

presented fits within the scope of an EOP, there are a number of steps that need to be taken. Speaking with someone in an organization in your state who works with domestic abuse is a good place to start. In many states this could be someone who works with DOVE. The person may need to venture to the clerk's office at the court house and obtain the forms for an EOP. The clerks may be able to both identify which forms are necessary and help the individual complete them. An individual may also seek assistance from outside organizations in order to complete the forms or if needed, obtain emergency housing. There is generally no cost and, once submitted, the judge will make a decision and the abuser served in the same day. When the judge issues this order, the court will also schedule what is called a Plenary, that is, a court date where both parties will be present and the judge will determine whether or not to make the emergency order of protection permanent by issuing a Plenary Order of Protection. If the order is granted and the abuser violates the order, the victim can call the police who may arrest the abuser. Lastly, grandparents raising grandchildren may file an EOP on behalf of themselves or the child against one or both of the natural parents regardless of who has custody.

Individuals who are not in a relationship with, are not family members of, or who do not reside in the same home as the person against whom they are seeking protection (everyone else in short), will need to use the common law process for obtaining a restraining order. Each state's process for doing this will vary. Again, one of the best sources for obtaining details about a specific state's process is an organization that works with domestic violence issues. In Illinois, for example, the first step is to request a Temporary Restraining Order (TRO). Both California and New York generally use the same terms. The person making the request will hire an attorney who will draft a petition that includes a request for a TRO, preliminary injunction, and permanent injunction and file it with the court. Within a few days, the individual and their attorney will have a court date to request the TRO and preliminary injunction hearing date. This is done *ex parte*, meaning without the defendant or his or her attorney present. The judge will then make a decision on whether or not to grant the TRO and will also schedule the preliminary injunction hearing. The clerk's office will issue a summons to the alleged abuser for the second hearing date. At the second hearing, also called the preliminary injunction hearing, both parties will be present and the judge will make a

determination as to whether or not to grant the preliminary injunction. If it is granted, a third court date will be set for determining the permanent injunction. If the judge denies the preliminary injunction, the plaintiff will not be afforded legal protection until a decision is reached at the permanent injunction hearing. Unfortunately, if the abuser violates the court order the victim does not have the option of merely calling the police and having the violator arrested. Instead, the victim will have to take the violator to court each time the violator violates the court order.

In California, the intermediate or second hearing no longer exists, which means that it is really a two-step process. In New York the process is similar: the attorney will submit a petition and the judge will make an ex parte determination on the same day, order a summons to be delivered to the alleged abuser (the TRO is not effective until the summons is delivered, which may present some problems if the abuser cannot be found) and schedule a return date for a final determination.

People who are single, divorced, unmarried couples, or in same-sex relationships may not fall within the scope of protection of the statutes depending on the state they reside in. If an individual's circumstances do not fall into one of these categories then they can seek protection via the second method starting with hiring an attorney and requesting a TRO and following the procedures.

Related Topics

➤ Elder abuse and neglect, ➤ Family violence, ➤ Intimate partner violence, ➤ Legal services

Suggested Resources

<http://www.safehorizon.org/page.php?nav=sb&page=legalassistance>

Thyroid Disease

Armand Krikorian

The thyroid gland, located below the “Adam’s apple” in the neck, is responsible for the production of thyroxine. This hormone regulates body metabolism and

affects several aspects of body function, including heat and cold regulation, and the digestive, respiratory, reproductive, and neuromuscular systems.

Disorders of the thyroid gland commonly occur in the elderly, and affect about 10% of people age 65 and over. They are more common in women, affecting 15% of women aged over 70. These disorders encompass thyroid gland underfunction (hypothyroid), overfunction (hyperthyroid), as well as benign and malignant nodules of the thyroid. Untreated, these diseases can greatly decrease a person’s quality of life and potentially be fatal.

Hypothyroidism is the most common disorder of the thyroid gland. In nearly all cases, it is due to a problem within the gland where not enough hormone is produced. This can also result from some medications, surgical removal of the thyroid gland, radioactive iodine treatment, and pituitary gland diseases. The most common cause of primary hypothyroidism is called Hashimoto’s thyroiditis, an autoimmune condition where the body produces cells called antibodies that attack its own thyroid tissue.

The classical symptoms of hypothyroidism reflect slowing in overall metabolism and include feeling of cold, constipation, fatigue, mental slowing, dry skin, coarse hair, puffiness, weight gain, slow heart rate, increased blood pressure, and menstrual irregularities. Fatigue and weakness are the most prominent symptoms in the elderly. These symptoms may develop slowly and subtly, and can easily be confused with normal aging.

The diagnosis of hypothyroidism is made by measurement of blood levels of the thyroid hormone thyroxine and a pituitary hormone that controls the thyroid called thyroid-stimulating hormone (TSH). Levels of TSH rise when blood levels of thyroid hormone are low and vice-versa. The appropriate combination of test-results establishes the diagnosis.

The treatment of hypothyroidism consists of the administration of thyroid hormone (levothyroxine) in the form of tablets of various dosages, usually taken once a day. Improvement in symptoms starts usually within 2 weeks after initiation of therapy. Monitoring of blood levels of TSH and thyroxine is done periodically to ensure adequacy of therapy. In the elderly population, thyroid hormone replacement is usually initiated at a low dose and gradually increased to target, due to concerns about stressing the heart with an abrupt full-dose therapy. Surgical removal of the thyroid is usually not performed for the treatment of hypothyroidism.

Screening for hypothyroidism in the general population in the absence of symptoms is controversial. Recent statements from the US Preventive Services Task Force as well as a clinical consensus group have advised against population-based screening.

Hyperthyroidism represents an excess of thyroid hormone, whether due to over-intake of thyroxine during treatment for hypothyroidism or due to increased production by the thyroid. The most common cause of hyperthyroidism is Grave's disease, where antibodies are produced that cause an overactivity of the thyroid gland. Other causes include independent functioning thyroid nodules and some forms of inflammation of the thyroid (thyroiditis). Iodine-induced hyperthyroidism occurs after the intake of iodine-rich substances such as the dietary supplement Kelp, drugs (amiodarone), or iodinated contrast media for radiological procedures.

Regardless of its cause, hyperthyroidism represents a state of increased metabolism, with its manifestations contrasting with hypothyroidism. These include warm skin, thinning of the hair, increased heart rate, irregular heart rate (atrial fibrillation), weight loss, increased appetite, diarrhea, menstrual abnormalities, tremors, inability to concentrate, memory loss, and muscle weakness. Elderly patients may present with more subtle symptoms, such as silent atrial fibrillation, or a state of apathy. In Grave's disease, involvement of the eyes, with outward protrusion, is typical.

The diagnosis of hyperthyroidism is also made by measuring blood levels of the thyroid hormone and TSH. TSH levels are typically low and thyroid hormone levels high. In addition, measurement of thyroid-receptor antibody levels may be a clue to the diagnosis of Grave's disease. To further establish the cause of hyperthyroidism, scanning of the thyroid using radioactive iodine may be performed.

Three different modalities are used for the treatment of hyperthyroidism: medications, radioactive iodine, and surgery. The choice depends on the cause of hyperthyroidism as well as patient's preference. Of the three, surgery is used least often. It is reserved for situations where the thyroid is so enlarged that it affects swallowing or breathing, or all other therapies fail. It is also a reasonable approach for cosmetic reasons.

Medical therapy is in the form of pills such as methimazole or propylthiouracyl (PTU). These drugs are effective in controlling hyperthyroidism, but a relapse may occur after their discontinuation. Their

side effects are mainly on bone marrow and liver, hence a complete blood count and liver function tests are obtained periodically during therapy.

Radioactive iodine is a safe and effective way of curing hyperthyroidism as it acts by destruction of the overactive thyroid gland. It is administered orally and its main side effect consists of the potential for destruction of the entire thyroid gland, resulting in hypothyroidism.

The presence of thyroid nodules increases with age and may be associated with either hyper- or hypothyroidism. Although most thyroid nodules are benign in nature, the risk for malignancy in a newly discovered thyroid nodule is higher in males. Other risk factors include a history of childhood irradiation and a rapidly expanding mass. Fine-needle aspiration, an office procedure, is the best means to evaluate a nodule for the possibility of malignancy. The prognosis of thyroid cancer depends on its type, but is overall favorable. Treatment includes a combination of surgery, radioactive iodine, and thyroid hormone replacement.

Related Topics

► [Diabetes](#)

Suggested Readings

- Habra M, Sarlis NJ (2005) Thyroid and aging. *Rev Endocr Metab Disord* 6:145–154
- Laurberg P, Andersen S, Bulow Pedersen I, Carle A (2005) Hypothyroidism in the elderly: Pathophysiology, diagnosis, and treatment. *Drugs Aging* 22:23–38
- Morley JE (2003) Hormones and the aging process. *J Am Geriatr Soc* 51:S333–S337
- Rehman SU, Cope DW, Senseney AD, Brzezinski W (2005) Thyroid disorders in elderly patients. *South Med J* 98:543–549

Transgenderism

Rashmi Gangamma

Transgenderism is an umbrella term given to individuals who do not conform to the conventional norms of gender identity and behavior, and transcend the boundaries of a rigid binary system of gender identification.

Transgendered individuals are characterized by cross-dressing, either part-time or full-time in order to obtain psychosocial benefits. They are however, distinguished from transvestites, as in the case of the latter, cross-dressing is usually considered a fetish primarily adopted for sexual gratification.

Aging among these individuals can be a challenging prospect as the transgender elders have unique needs specifically related to their age as well as gender status. The process of aging entails physical, psychological, and social changes and for those who are marginalized, it may become stressful. It is a well-documented fact that social support, financial security, and access to health care are factors that influence well-being, especially in the elderly population. Although these factors may not be guaranteed to all, there is hope that they have opportunities to attain them. However, for those already struggling with the stigma of being the “other,” the pathways to attain them lay strewn with obstacles.

Transphobia permeates most spheres of the society and the elderly population seems particularly vulnerable to its effects. Apart from hate crimes and violence that they are subject to, there are other discriminatory practices that affect their quality of life. Access to health care also depends heavily on the individuals’ perception of the health care professionals themselves. Issues of disclosure and privacy play a role in the decisions to seek health care. Crossdressers may have to choose between disclosing their status or delaying services, which increases their risks as older individuals.

According to a survey conducted in 2000, there are only five states with explicit laws against discrimination that are transgender inclusive. Sixty-two other cities and ten counties have similar antidiscriminatory practices. However, this means that a large proportion of this population is not protected by law and therefore may face greater risks of unemployment or underemployment. In fact, it is often noted that transgendered individuals are less likely to be educated or in high-paying jobs. This may indicate a further risk for the elderly population who may not have a retirement plan or compensation.

The possibility of ostracism, not just by the society at large, but also by their own families has also been well documented. In some cases they may face the possibility of being homeless or even suppress their identity in order to maintain relationships. Needless to say, this would ultimately increase their vulnerability to physical and psychological stressors. The absence

of an adequate network of friends and family could hinder the usually mundane activities of getting medicines, doctor visits, socializing, or even a sense of security in one’s home. They may also be more prone to elder abuse and neglect by their family. Older transgenders are also known to face ostracism by their younger counterparts, which could further isolate them.

Considering the widespread attention on the risks and vulnerabilities facing this population, one may be tempted to wrongly conclude that there are no positive factors associated with this population. There are instances where following support from family and community members, individuals have been able to fight discrimination and claim their rights. However these are so few and far between that instances of oppression gain more precedence.

What do the elderly transgender individuals need? Better access to care, insurance coverage for treatment, antidiscriminatory practices at work, retirement homes that are welcoming of differences, and the right to live with dignity. These needs are not vastly different from the general elderly population and yet these are needs they have to struggle to fulfill everyday.

It is widely acknowledged that the well-being of an individual depends on the existing social and political climate. In a period of time where the odds are stacked against those considered “different,” spreading awareness and increasing sensitivity among the general public has gained impetus at least in the developed nations. As a result there are numerous resources in the form of support groups, advocacy agencies, counseling, education programs, and online networks that have been fairly successful in highlighting injustice and helping those who struggle with their life as a transgendered individual. These efforts may not reach every single person, but it is the start of a movement towards the utopia of understanding and acceptance.

Related Topics

➤ [Access to health care](#), ➤ [Discrimination](#), ➤ [Elder abuse and neglect](#), ➤ [Social support](#), ➤ [Transsexuality](#), ➤ [Stress](#), ➤ [Violence](#)

Suggested Readings

Kessler SJ, McKenna W (1985) *Gender: An ethnomethodological approach*. University of Chicago Press, Chicago, IL

Suggested Resources

Witten TM, Eyler EA, Weigel C (2000, Winter) Transsexuals, transgenders, crossdressers: Issues for professionals in aging. Retrieved 28 November 2005; <http://www.asaging.org/networks/lgain/outword-063.html>

Witten TM (2001, October) White paper: Transgender and intersex aging issues. Retrieved 28 November 2005; <http://www.transcience.org>

Transportation Services

Mark T. Wright

The primary mode of transportation in the United States is the personal vehicle. According to the 2001 National Household Travel Survey, 92% of all households owned at least one vehicle and 87% of all daily trips were taken in a personal vehicle. Among elders, about half of the private vehicle trips taken are for shopping and health care. Since almost three-fourths of older Americans live in suburban or rural areas, where travel is necessary to access health care and other basic life necessities, elders are highly dependent upon automobile transportation.

Many older people drive less than they did when they were younger, and about 20% of the elderly do not drive (in comparison, 12% of individuals aged 15 or older do not drive). A number of factors may limit use of personal vehicles by older adults. Limited access to vehicles may play a role: in 1999, 17% of elderly households had no vehicles. It is not clear if elders who lack a vehicle do not need it, cannot use it, or cannot afford it. Retirement and other role changes associated with aging may make driving less necessary. Sensory and cognitive changes associated with normal aging may impair driving abilities and make drivers less confident in their skills. Aging-related changes in visual acuity, ability to see in dim light, and color discrimination may make driving more difficult. Aging is also associated with decreased complex attention abilities and diminished processing of visual and other information, changes that may further impede driving. These normal aging changes lead some older individuals to limit their driving to daytime, off-peak hours, and to use only familiar roads. Illnesses affecting vision and movement such as glaucoma, arthritis, and diabetes

are common in the elderly and can produce physical impairment incompatible with safe driving. Illnesses that produce serious cognitive impairment such as Alzheimer's disease and cerebrovascular disease can obviously impede safe driving as well. Many medications commonly used by the elderly can cause sedation or cognitive impairment that can make driving unsafe.

Concerns about the safety of elderly drivers have increased in recent years. Although healthy older adults drive as well as healthy younger people, and do not account for a disproportionate number of motor vehicle accidents or road deaths, the number of accidents per mile driven does increase with advancing age. Fatalities per mile driven are also higher in older adults than in younger adults; physical fragility associated with aging may increase the risk of death in an accident.

Particular concerns arise in relation to elders with dementia. Dementia may cause deficits in attention, visuospatial skills, and executive functioning (e.g., planning abilities) that can be particularly detrimental to driving. Although very mild dementia may not significantly impair driving, the ability to drive does decline significantly with increasing dementia severity. Unfortunately, individuals with dementia and their friends and relatives often do not recognize problems with driving, and a number of people with advanced illness continue to drive despite severe cognitive dysfunction.

Finding solutions to driving and other transportation problems of elders will be a difficult task. Safety concerns often lead to consideration of suspension of older adults' driving privileges. Although this seems justifiable in individuals incapacitated by dementia or physical ailments, it is not justifiable for healthy elders, who are generally safe drivers, or for dementia patients with very mild impairment. In weighing the risks and benefits of driving, it should be kept in mind that curtailment of driving privileges for elders may be associated with increased morbidity and mortality.

Many elders find loss of driving privileges extremely distressing. An inability to drive can result in decreased self-esteem, independence, and social interaction. Problems with access to transportation have been shown to correlate with decreased usage of medical services, particularly in rural areas. Caregivers who are called upon to provide transportation for elders experience significant disruptions in their lives as well.

It is commonly argued that elders should be helped to drive as long as they can safely do so, and decisions to stop driving should be based on driving competence

and not on age or medical diagnoses. Increased public education is needed on how driving is affected by normal aging and illnesses associated with aging, such as dementia. Improved physician screening of patients at-risk for driving problems could lead to better use of driver retesting (via driving simulators or on-road testing) and rehabilitation resources.

Programs like the AARP Driver Safety Program and trained driver rehabilitation specialists can help identify impediments to safe driving and offer solutions. For drivers who are neither totally safe nor unsafe, license limitations tailored to specific impairments (e.g., no night driving) can allow drivers to maintain their licenses longer while protecting both the driver and the public. Improvements in roadways such as making signs easier to read and constructing more left-turn lanes could also help elderly drivers. Older adults who cannot drive but can walk could be helped by measures that facilitate walking such as better sidewalks, places to rest, and traffic lights that allow slowly moving pedestrians to cross streets at a reasonable pace. The development of “walkable communities” could greatly decrease the need for private transportation.

Public transportation and transportation sponsored by health care providers are alternatives to the personal vehicle. The extension of public transportation to suburban and rural areas where most elders live may be limited by cost, though. Older adults may also be hesitant to use public transportation, possibly because public transportation is not ergonomically designed to accommodate them. Increasing “paratransit” services, or public transportation designed with the physical and cognitive limitations of some elderly people in mind could be helpful.

As the elderly population grows, medical and social service agencies will need to consider the location of their clients as they locate and plan their services. For elderly people with very limited or no mobility, the provision of health services via home visits, telephone calls, or the Internet could facilitate ongoing care. It remains to be seen whether savings associated with improved health and functioning can offset costs incurred in providing elders with alternatives to private transportation.

Related Topics

➤ Accidents, ➤ Driving safety, ➤ Isolation, ➤ Pedestrian injuries, ➤ Quality of life, ➤ Rural health, ➤ Travel

Suggested Readings

- Brown LB, Ott BR (2004) Driving and dementia: A review of the literature. *J Geriatr Psychiatry Neurol* 17:232–240
 Rosenbloom S (1993) Transportation needs of the elderly population. *Clin Geriatr Med* 9:297–310

Suggested Resources

- American Association of Retired Persons (AARP), 1998–2005, Washington, D.C.; <http://www.aarp.org/research/housing-mobility/transportation/>
 American Medical Association, 2003, Chicago, IL; <http://www.ama-assn.org/ama/pub/category/10791.html>
 U.S. Department of Transportation Bureau of Transportation Statistics, 2001, Washington, D.C.; http://www.bts.gov/programs/national_household_travel_survey/

Transsexuality

Rashmi Gangamma

Transsexuality is the most extreme manifestation of gender dysphoria—a psychological condition in which a person’s gender identity is opposite to that of their sex at birth. In other words the individual feels “trapped” in a body that does not “fit” the perception of his or her gender. Most of them undertake measures to correct this through sex reassignment surgery (SRS) and hormone therapy. Although the medical establishment and popular media use the term *transsexual*, a growing activist movement has rejected this and recommend using *trans people* or *trans woman* or *trans man*.

The process of transition is long and can have psycho-socio-economic impact on their lives. Aging in this population brings about issues that are similar to the transgender and intersex population. In most individuals, transitioning has been known to increase feelings of well-being. After years of suppression of one’s gender identity, they experience resurgence in enthusiasm for life. The increased freedom of expression catalyses experiences of positive personal sensuality. Older trans people also have the advantage of having the natural aging process camouflage the differences due to hormone therapy. Both male and female elders

acquire softer features thus reducing the possibilities of being “outed.”

Although it has been noted that female-to-male (FTM) transitions typically occur years after identifying oneself as a lesbian, male-to-female (MTF) transitions occur later in life. Individuals opting to transition later in life face more health challenges than their younger counterparts. Several medical conditions like a history of cardiac illnesses could make them ineligible for surgery. Hormone therapy could create additional risks, for instance, androgen supplementation in FTM could increase the risk for coronary artery disease. However, it could potentially reduce the occurrence of bone diseases.

Regular and timely medical care could, however, become a problem for those who anticipate a negative reaction from health care providers. This could lead to delay in accessing facilities that in turn increases their vulnerability illnesses. The fear of losing privacy and the risk of facing ridicule or even refusal to treatment plays an important role in their decisions to visit professionals.

Underemployment and unemployment is known to be common among the trans people. This directly affects their ability to build financial security that is considered crucial during the later years. Employees undergoing gender transition can be subject to ridicule and humiliation against which there are very few laws in the country. This could affect their health care decisions as well as most insurance companies do not cover treatment expenses for transitioning.

Though not many individuals decide to undergo transition in later years, redefining one's roles as a father or mother, grandfather or grandmother can be extremely daunting. This change involves not just the individual but also the partner involved who also understands the fact that there has been a change in the relationship but not in their orientation.

Support derived from family members is crucial in the degree of social integration of the trans person. Coming out to their families could potentially place them at risk for violence and hate crimes. Considering the absence of laws protecting this population, elder abuse and neglect could easily go unreported. The older individuals are also known to face discrimination and ridicule from their younger counterparts, thus isolating them further.

Further, seeking care in assisted living facilities may be a challenge for them given the potential for ostracism by others. This may be particularly difficult for those who have transitioned at a later stage, who may

have incongruence in their gender presentation and history of their personal relationships.

The needs of the elderly are not drastically different when compared to the non-transsexual aged population. However, the sociopolitical climate of the society, the absence of adequate laws against discrimination, and lack of social support increase the stressors faced by the older trans people.

Related Topics

► Discrimination, ► Intersexuality, ► Sexuality, ► Transgenderism

Suggested Readings

Brown ML, Rounsley CA (2003) True selves: Understanding transsexualism—For families, friends, coworkers, and helping professionals. Jossey Bass, New Jersey

Suggested Resources

Witten TM (2001, October) White paper: Transgender and intersex aging issues. Retrieved 28 November 2005; <http://www.transcience.org>

Traumatic Injury

Aaron L. Rogaczewski · Travis P. Webb

Trauma remains one of the leading causes of death and disability in the United States. When considering people of all ages, traumatic injury ranks as the fifth leading cause of death. Overall, the prevalence of injury-related death is estimated at 37 per 100,000 people. For the elderly (<65 years), traumatic injury is the ninth leading cause of death with an injury-related death rate of 95 per 100,000 people 65 years and older. Although only constituting 12% of the population, elderly trauma accounts for nearly 23% of all trauma admissions and one third of all injury-related deaths. Despite being injured less frequently than their younger counterparts, the elderly are at higher risk to suffer fatal injury or an injury requiring hospitalization. Elderly individuals who suffer nonfatal injuries are at an

increased risk for complications and permanent loss of independent function. These differences are generally attributed to the normal aging process, resulting in a progressive loss of physiologic functional reserve and a higher incidence of comorbid disease.

As the population ages, there will be an unprecedented number of elderly persons at risk of injury and death. The burden on society and the health care system will continue to increase. Currently, 28% of total trauma-related hospital charges are for the care of elderly trauma victims. Assuming injury rates remain constant, by the year 2030, elderly trauma victims will account for as much as 40% of all injury-related hospitalizations and deaths. The amount of health care spending will correspondingly increase.

Although the elderly experience similar types of injuries as younger individuals, a number of differences exist with respect to mechanisms and frequency of injury. Falls are an extremely common event in the elderly that pose serious health risk. It is estimated that roughly one of every three elderly individuals will fall each year. Despite typically occurring at home and rarely from great heights, falls represent the most frequent cause of injury-related hospitalization and death. In 2002, over 11,000 people over age 65 died due to injuries sustained during a fall. Of note, 83% of these deaths occurred in people over the age of 75. Serious injury is often related to mild to moderate head injury and bony fractures, leading to long-term disability and often death. For those surviving a fall requiring hospitalization, up to 50% will subsequently be discharged to a nursing home; moreover, up to 50% will die within the next year.

Motor vehicle crashes are the second leading cause of traumatic injury and death in the elderly, accounting for over 7,000 deaths in 2002. Motor vehicle crashes are the leading cause of trauma-related deaths for older adults between the ages of 65 and 74. Although elderly drivers log fewer miles on the road, they are involved in a disproportionately high number of crashes. Drivers over the age of 75 have a crash rate that is second only to new drivers between the ages of 16 and 25 years of age. Furthermore, they have the highest crash fatality rate of any group. In addition to motor vehicle crashes, the elderly also have the highest population-based fatality rate for pedestrians struck by vehicles. This accounts for nearly 20% of the yearly vehicle-pedestrian fatalities. In 2002, over 1,000 pedestrians over the age of 65 were struck and killed by moving vehicles in the United States.

Although violent crime is typically thought to be associated with the younger population, the geriatric population is increasingly susceptible to violence both in and out of the home. Injuries secondary to violent assaults account for 4–14% of elderly trauma admissions. Up to 4% of the elderly are also victims of elder abuse, which may be physical, psychological, sexual, or financial.

A number of factors influence the risk of injury in the elderly. A progressive diminution of cognitive and motor skills is a normal part of aging. The elderly experience changes in postural stability, balance, motor strength, and coordination that predispose them to injurious events. Changes in visual acuity and hearing may lead to an inability to recognize and avoid hazardous situations. Undiagnosed systemic disease and illness often increases injury risk in the elderly. Frequently, traumatic injuries are the initial presentation of an acute or chronic illness that has not been previously recognized. Lastly, drug interactions and medication effects have been associated with potential increased injury risk.

As stated earlier, the high mortality rates associated with trauma in the elderly population appear to be due to physiologic changes associated with aging and the overall ability to tolerate the physiologic stress of injury. The normal aging process involves an ongoing progressive decline in cardiac, pulmonary, and renal function and reserve. Thus, the elderly patient has less ability to tolerate injury-induced stress. However, it should be emphasized that chronologic age poorly correlates with physiologic age, and organ function and physiologic reserve varies greatly between individuals. Therefore, generalizations should be avoided in the elderly population.

Despite the current discouraging statistical trends associated with traumatic injury in the geriatric population, many injuries are preventable. Injury prevention is widely recognized as holding the best potential for benefit. Substantial impact can be made using preventive strategies such as home safety inspections, frequent review and modification of medication regimens, and treatment of motor and sensory changes that affect one's ability to both perceive and navigate safely through the environment. Over recent years, public safety programs and driver education courses focusing on the elderly have also become available in many communities. Overall, a heightened awareness of all aspects of geriatric trauma is needed, and implementation of

injury prevention programs and public education will be important as this segment of the population continues to grow.

Related Topics

► Driving safety, ► Elder abuse and neglect, ► Falling, ► Falls prevention, ► Firearms, ► Pedestrian injuries, ► Violence

Suggested Readings

Centers for Disease Control and Prevention (2005) Deaths, percent of total deaths, and death rates for the 15 leading causes of death in selected age groups, by race, and sex: United States, 2002 (LCWK3). Centers for Disease Control and Prevention, Atlanta, GA

Suggested Resources

American Geriatrics Society. Position paper on falls prevention; www.americangeriatrics.org/products/positionpapers/abstract.shtml

Centers for Disease Control and Prevention. National Center for Injury Prevention and Control. Pages regarding elderly drivers, (5 August 2004); www.cdc.gov/ncipc/factsheets/older.htm.

Centers for Disease Control and Prevention. National Center for Injury Prevention and Control. Pages regarding elderly fall victims, (9 September 2005); www.cdc.gov/ncipc/factsheets/falls.htm

EAST Practice Management Guidelines Work Group (2001) Practice management guidelines for geriatric trauma. Eastern Association for the Surgery of Trauma (EAST), Allentown, PA; www.east.org/tpg/geriatric.pdf

Travel

Gary W. Edmunds

With the improvement of the general conditions of life, the average life expectancy increased by about 25 years from a century ago. As a result, four distinct age segments exist: the young old (55–64), the middle old (65–74), the senior sector (75–84), and the very old (85 and over). Sometimes referred to as the maturity market, older consumers are now recognized as a

major force in the US marketplace and are growing at a rate twice that of the overall population. Preplanned leisurely travel is more popular with the older group (50 and over); travel agents are consulted by about one in four older people.

Older persons may be motivated to travel in order to increase opportunities for socializing, self-fulfillment, physical exercise, learning, rest, relaxation, contact with relatives, change of pace, escape, challenge, and excitement. In addition, older adults may be searching for a particular sense of significance, meaning, and quality of life because life must hold more meaning than just surviving. Recreational travel opportunities should add meaning and renewal to one's life, to contribute to one's personal well-being by providing the necessary mental, physical, and psychosocial stimulation. For seniors, the winter season, especially between the Christmas holiday season and spring break, is slow and travel companies often offer discounts. Older individuals are more likely to be able to avail themselves of these opportunities because they often have more time for travel and have more flexibility to travel at various times.

The Centers for Disease Control and Prevention has information about outbreaks of infectious disease around the world and recommendations for vaccinations needed for travel. Elderly individuals have had delayed development of immune responses following the administration of some vaccines, decreased peak antibody responses, more rapid waning of protective antibodies, decreased protective efficacy, and increased side effects. Many vaccines currently in use, and particularly those given prior to travel, have never been specifically studied in elderly subjects. In addition, interactions among vaccines in elderly recipients have not been adequately studied. Older people have a greater risk of complications from certain travel-related infections, including Japanese encephalitis, yellow fever, hepatitis A, and typhoid fever. Accordingly, immunization against these infections may be particularly important for older travelers. Timing of adequate immune responses is of particular relevance to travelers because slower development of immunoprotection implies that earlier administration of travel vaccines may be required.

Plane travel is more popular for the over-50 group. Limited leg room continues to be the worst feature of plane travel, according to passenger surveys. Uncomfortable and narrow seats may impede normal blood circulation and sitting still for long periods of time can increase the risk of edema (the presence of excessive fluid in tissue spaces usually causing the lower limbs to

swell), and deep venous thrombosis (the formation of a blood clot within a blood vessel). Cardiac conditions constitute the most common cause of in-flight deaths and cardiac-related problems are the highest causes of in-flight emergencies. Counseling and screening from a primary care physician is recommended to advise those against traveling if necessary for those who are at risk.

Recent studies have found that travel across time zones may act as a causal factor in affective psychoses, with most taking place within 2 weeks of travel; one-half of individuals affected have a history of prior psychiatric treatment. Once reported, recovery is usually rapid. Some experts have suggested that eastern travel may precipitate mania and western travel depression but this theory has not been substantiated. In any event, travelers should be aware of the possibility that traveling great distances may precipitate acute mental illness, particularly in those with a past psychiatric history.

The elderly traveler should take out adequate medical insurance to cover any eventuality as the costs of medical insurance for nonresidents in many countries are high. For older travelers who require oxygen, air travel is possible with advance planning. Due to federal aviation regulations travelers are not allowed to carry their own oxygen on aircraft but it can be supplied by the airline for a fee. This will have to be arranged in advance by either the traveler or travel agent and oxygen at the new destination will have to be arranged also. The airline fee for oxygen is not likely to be covered by Medicare or other insurance as it duplicates equipment that has already been paid for. These costs must be figured into a vacation budget.

Nothing could be worse than to lose money because an emergency requires the postponement of a trip. Regularly scheduled airlines usually give a refund if illness or death in the family requires that the trip be cancelled, but this requires a letter from a physician or a death certificate. In addition to possible accident and illness coverage while traveling, insurance can cover travel company default as well. Since the US government cannot pay for shipment of remains back to the United States, it is a wise and worthwhile precaution to have insurance that covers this cost, considering that 2,000 Americans die annually while visiting abroad. If not, this cost must be borne by the next of kin and can be extremely expensive. With planning and research, many seniors who presently do not travel could enjoy worry-free travel.

Suggested Resources

Government website with travel advice for seniors; <http://www.firstgov.gov/Topics/Seniors.shtml>

Travelocity site with information for seniors; <http://seniors-site.com/travel/>

Trigeminal Neuralgia

Matthew Eccher

Trigeminal neuralgia, pain, and symptoms along the trigeminal nerve that supplies areas of the face, is a clinical diagnosis defined by its symptoms: sharp, shooting, electric-shock-like pains in one side of the face, excruciating in severity, very sudden, maximal at onset, typically lasting seconds only. The excruciating severity of pain often causes sufferers to wince, hence the other common term for the condition “tic douloureux.” The pain can often be elicited by stimuli such as chewing, talking, light touch in the affected area, or cold air on the face. The sufferer typically learns to avoid these eliciting stimuli, and such avoidance behavior can have a profound impact on the individual’s life. The frequency of attacks tends to wax and wane, with some periods of remission common. The impression of most experienced clinicians, however, is that trigeminal neuralgia is a relentlessly recurring and ultimately a progressively worsening disorder, though data to support this perception are lacking. The location of the pain is typically the maxillary (cheek bone area) and mandibular (jaw area) divisions of the trigeminal nerve, but can involve any one portion of the nerve at a time or all three portions of the nerve.

The cause of trigeminal neuralgia is usually unknown. The most common cause, when one can be identified, is compression of blood vessels due to a twisting blood vessel pressing on the nerve. Other causes include multiple sclerosis and lack of vascular blood flow. The mechanism by which such lesions cause the condition is poorly understood.

Incidence rates are highly consistent between studies in different locales at different times: 3–5 per 100,000 per year in the general population. It has been estimated on this basis that there are 15,000 patients in the United States with the condition. More recent data suggests that the incidence climbs

significantly with age, to as high as 20 per 100,000 per year in those over the age of 60. Ninety percent of cases occur after the age of 40 years, with peak incidence between 40 and 60, but median age at onset of 67, reflecting the increasing cumulative prevalence in the elderly. This is unsurprising, because the condition itself has minimal effect on longevity, and most of the causes provoking the condition are increasingly more common with increasing age. Most cases are sporadic, with very few familial reports; women are somewhat more often affected than men (1.2–2:1).

The mainstay of medical treatment, since its introduction in 1962, has been carbamazepine, is an anti-seizure medication, which is 80–85% efficacious initially. Phenytoin and clonazepam are also effective, though somewhat less so; other newer antiseizure medications, in particular lamotrigine, oxcarbazepine, and topiramate, have seen increasing use, with lesser-published experience. Baclofen, used for spasms, is useful alone or in combination with an antiseizure medication. The choice of agent depends largely on the side-effect profile of each agent and interactions with the patient's other medications. Medical management, however, is efficacious in the long term in only about 50% of patients, leading many to consider surgery. Another factor favoring surgery is the sedative and cognitive adverse effects of the medications utilized, a phenomenon that has received surprisingly little attention in the literature.

When a compressive lesion is present, such as a meningioma or epidermoid tumor, surgical resection is often pursued. When the cause is vascular impingement on the nerve and the patient is a good surgical candidate, so-called “microvascular decompression” is an option. This procedure aims to place a piece of synthetic material between the vessel and the nerve, essentially cushioning the nerve from the artery's pulsatile impingement. Success rates are fairly high when vascular impingement can be identified, but carry the risk of having to open the skull, including the low but nonetheless real risk of death. Other options include getting at the base of the nerve root and the core of the problem by disrupting the trigeminal ganglion (nerve root) with stereotactic radiosurgery, thermocoagulation, glycerol injection, or inserting a balloon to make a crush-like injury, each of which aim to interrupt all trigeminal neurotransmission or function. The less invasive procedures tend to be favored for those patients who for reasons of advanced age or other medical comorbidities are

poor candidates for potential open skull surgery. The various efficacies and risks of these procedures are beyond the scope of this review and data showing. Comparatively little formal study has been done of the effect of this condition on quality of life, and less still on caretaker burden. This is likely due not only to the lower prevalence of the disease but also to its entirely subjective nature as a pain syndrome. Surgical studies can and do demonstrate cost-effectiveness of the various surgical procedures, but are not intended to provide an estimate of pre- or post-procedure disease burden. A literature search at the time of this writing revealed no attempted evaluations of nonsurgical treatments. Data are therefore essentially lacking on the impact of this potentially debilitating condition on patients' and families' lives. It is likely that the current era of cost-consciousness in medicine will create pressures, leading to the generation of more data regarding the cost-effectiveness of surgery.

Related Topics

◆ Epilepsy, ◆ Headache, ◆ Pain

Suggested Readings

- Kitt CA, Gruber K, Davis M, Woolf CJ, Levine JD (2000) Trigeminal neuralgia: Opportunities for research and treatment. *Pain* 85:3–7
- Manzoni GC, Torelli P (2005) Epidemiology of typical and atypical craniofacial neuralgias. *Neurol Sci* 26(suppl 2):S65–S67
- Pollock BE, Ecker RD (2005) A prospective cost-effectiveness study of trigeminal neuralgia surgery. *Clin J Pain* 21:317–322
- Rozen TD (2004) Trigeminal neuralgia and glossopharyngeal neuralgia. *Neurol Clin N Am* 22:185–206
- Zakrzewska JM (2000) Consumer views on management of trigeminal neuralgia. *Headache* 41:369–376

Tuberculosis

Thomas W. Heinrich · Mark T. Wright

Tuberculosis is an infectious disease primarily affecting the lungs and can be characterized by fever and the production of mucus and sputum. It has plagued humankind for ages and has long been viewed as an affliction suffered by disenfranchised members of

society such as the poor and homeless. Tuberculosis is caused by *Mycobacterium tuberculosis* and remains a common infectious disease worldwide. *M. tuberculosis* infection can be dormant and fully contained by the immune system or progress to an active disease state.

Prevalence

Almost a third of the world's population is infected with *M. tuberculosis*, and more than half of these infections occur in developing countries. The highest per capita incidence of infection is in sub-Saharan Africa. The World Health Organization estimates that there are more than 8 million new cases and 2 million deaths worldwide from tuberculosis each year. The high rates of tuberculosis infection and death in developing countries are likely related to the limited medical and financial resources present in these regions, making effective prevention and treatment difficult.

In the United States, the incidence of active tuberculosis has steadily declined since 1992 after an increase in the early 1990s. The brief increase in active tuberculosis cases was likely related to multiple factors including the human immunodeficiency virus (HIV) epidemic and immigration from countries with high rates of tuberculosis infection. Tuberculosis, however, continues to represent a clinical and societal challenge in the United States.

Tuberculosis and Older Adults

The primary route of entry for tuberculosis is the respiratory system, and approximately 75% of older patients with tuberculosis present with pulmonary involvement. Tuberculosis may also infect other organ systems as diverse as the central nervous system, skeletal system, and genitourinary system. The infection may also disseminate throughout the entire body, causing an extremely dangerous form of tuberculosis known as miliary tuberculosis. Elderly individuals are at increased risk for the development of these atypical sites of disease, and this confers an increased risk of morbidity and mortality.

Elderly people with pulmonary tuberculosis often do not present with signs and symptoms classically associated with the illness such as cough, fever, night sweats, weight loss, and blood-tinged sputum. Instead,

they may present with a nonspecific fatigue, poor functional capacity, or confusion. Elderly people with active pulmonary tuberculosis may likewise fail to demonstrate the characteristic skin testing response and chest radiograph findings commonly seen in younger patients. Nonpulmonary tuberculosis may present with symptoms as diverse as a fever, joint swelling, or seizures. As a result, tuberculosis in the elderly often represents a diagnostic challenge for the health care professional.

High-Risk Populations

Despite the decline in cases in the United States, tuberculosis remains an important health concern associated with significant morbidity and mortality. This is especially true for high-risk populations such as the elderly and the immunocompromised. Although a majority of cases of tuberculosis in the elderly occur in individuals who live in the general community, there appears to be a relative increase in the incidence of tuberculosis infection among nursing-home residents. An increased rate of positive tuberculin skin testing, a screening test for tuberculosis infection, has been observed in individuals who have resided in nursing homes for a prolonged period of time.

Tuberculosis and HIV coinfection form a particularly dangerous combination of illnesses. Because of the impaired immune status of the HIV-infected patient, concurrent tuberculosis infection is more likely to progress to an active disease state and become dangerously contagious. It has been estimated that the current HIV epidemic contributes over 1 million additional cases of active tuberculosis infection annually.

M. tuberculosis may simply lie dormant in an individual or progress to a more dangerous active disease state. The risk of dormant infection progressing to active tuberculosis varies with the carrier's immune status. Individuals with normal immunity progress from infection to active disease at a rate of 5–10% over their entire life span, with half of this risk occurring within the first 2 years of infection. However, individuals suffering from a tuberculosis coinfection with HIV have a 5–10% annual risk of developing active disease. It also appears that impaired immune function plays a role in the increased rate of active disease in the elderly. Approximately 90% of active tuberculosis in the elderly is secondary to reactivation of previously dormant infectious foci.

Treatment

The treatment of tuberculosis has undergone significant advances over the years. Before the advent of antimicrobial treatment, therapy included relaxation for the patient, often in sanatoriums, and attempts to rest the affected lung. Rest of the lung was accomplished through surgical procedures to collapse the afflicted lung. Prior to effective antimicrobial pharmacotherapy, pulmonary tuberculosis had an estimated 50% mortality and miliary tuberculosis was almost uniformly fatal. Current pharmacotherapy includes the use of the antimicrobial agents for the treatment of active disease and prevention of progression from dormant infection to active disease. Treatment is often prolonged, complicated by drug resistance, and may involve multiple medications and directly observed therapy (DOTS; i.e., by a health care worker) to ensure compliance. Drug treatment of tuberculosis in the elderly patient is often complicated by hepatotoxicity and other adverse drug reactions. Patients suspected to have active disease need to be kept in respiratory isolation to prevent spread of the infection to others.

Tuberculosis remains an important medical condition for older adults. Elderly individuals at risk for infection and active disease include those exposed to

M. tuberculosis for the first time, those reexposed after effective treatment, and those at risk for reactivation of dormant untreated infections.

Related Topics

➤ Acquired immunodeficiency syndrome, ➤ Homelessness, ➤ Immigrant health, ➤ Institutionalization, ➤ Pneumonia

Suggested Readings

- Packham S (2001) Tuberculosis in the elderly. *Gerontology* 47:175–179
- Rajagopalan S (2001) Tuberculosis and aging: A global health problem. *Clin Infect Dis* 33:1034–1039
- Zevallos M, Justman JE (2003) Tuberculosis in the elderly. *Clin Geriatr Med* 19:121–138

Suggested Resources

- American Lung Association, 2005, New York; <http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=35778>
- World Health Organization, 2006, Geneva; <http://www.who.int/tb/en/>